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WHAT IS CLAIMED IS :

1. An electromagnetic wave detector comprising a stack of layers made of III-V semiconductor materials, the conduction band profile of said materials defining at least one quantum well, said quantum well having at least one first discrete energy level populated with electrons that are capable of passing to a second energy level under the absorption of an electromagnetic wave and means for the reading of said electrons in the second energy level wherein the stack of layers of semiconductor materials furthermore comprises an electron storage layer separated from the quantum well by a transfer barrier layer, the thickness of the transfer barrier layer being about one order of magnitude greater than the thickness of the quantum well, the lower energy level of the conduction band of the transfer barrier layer being greater than those of the quantum well and the electron storage layer and decreasing from the quantum well to the electron storage layer so as to further the flow of electrons from the second energy state to the electron storage layer.

2. An electromagnetic wave detector according to claim 1, wherein the stack of layers made of III-V semiconductor materials furthermore comprises a first barrier layer and a third barrier layer made of semiconductor materials such that the lower energy level of their conduction band is respectively greater than the lower energy levels of the conduction band of the quantum well and of the electron storage layer.

3. An electromagnetic wave detector according to claim 1, wherein the decreasing profile of the lower energy level of the conduction band of the transfer barrier layer is obtained with a semiconductor alloy whose composition varies from the quantum well up to the electron storage layer.

4. An electromagnetic wave detector according to claim 1, wherein the decreasing profile of the lower energy level of the conduction band of the transfer barrier layer is obtained by the presence, in the stack of layers made of semiconductor materials, of a piezoelectric semiconductor material creating a natural electrical field.

5. An electromagnetic wave detector according to claim 1, wherein the stack of layers made of semiconductor materials comprises a first layer and a second layer of doped semiconductor materials on either side of the unit constituted by the electron storage layer/transfer barrier layer/quantum

5 well so as to enable the creation of an electric field responsible for the decreasing profile of the lower energy level of the conduction band of the transfer barrier layer.

6. An electromagnetic wave detector according to one claim 1, wherein the means of reading electrons in the second energy level comprise
10 a first ohmic contact and second ohmic contact located at the electron storage layer so as to carry out a measurement of photocurrent in the plane of the storage layer.

7. An electromagnetic wave detector according to claim 5, comprising the following stack of layers of semiconductor materials, starting
15 from the surface of a semiconductor substrate:

- a first barrier layer ;
- a quantum well ;
- a second barrier layer that is a transfer barrier layer;
- an electron storage layer ;
- a third barrier layer ;
20 the first and second ohmic contacts extending from the third barrier layer up to the electron storage layer.

8. An electromagnetic wave detector according to claim 6, comprising the following stack of layers of semiconductor materials, starting
25 from the surface of a semiconductor substrate:

- a third barrier layer ;
 - an electron storage layer ;
 - a second barrier layer that is a transfer barrier layer ;
 - an electron storage layer ;
 - a first barrier layer ;
30 and a mesa defined in :
 - the transfer barrier layer ;
 - the quantum well ;
 - the first barrier layer;
- 35 the first and second ohmic contacts being located on either side of the mesa.

9. An electromagnetic wave detector according to claim 1, wherein the means for the reading of the electrons in the second energy level comprise a first ohmic contact and a second ohmic contact located

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5 respectively in the quantum well and in the electron storage layer so as to carry out a photovoltaic reading of the voltage set up between the electrons of the quantum well and the electrons of the storage well.

10 10. An electromagnetic wave detector according to claim 9, comprising the following stack of semiconductors materials starting from semiconductor substrate:

- a first barrier layer ;
- a quantum well ;
- a second barrier layer that is a transfer barrier layer;
- an electron storage layer ;
- a third barrier layer ;

15 and an etching up to the level of the transfer barrier layer so as to make the first ohmic contact extending up to the quantum well and the second ohmic contact extending up to the electron storage layer.

11. An electromagnetic wave detector according to claim 1, further 20 comprising means to reset the flow of the electrons in the storage layer.

12. An electromagnetic wave detector according to claim 6, comprising third and fourth contacts located on either side of the stack of layers of semiconductor materials.

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